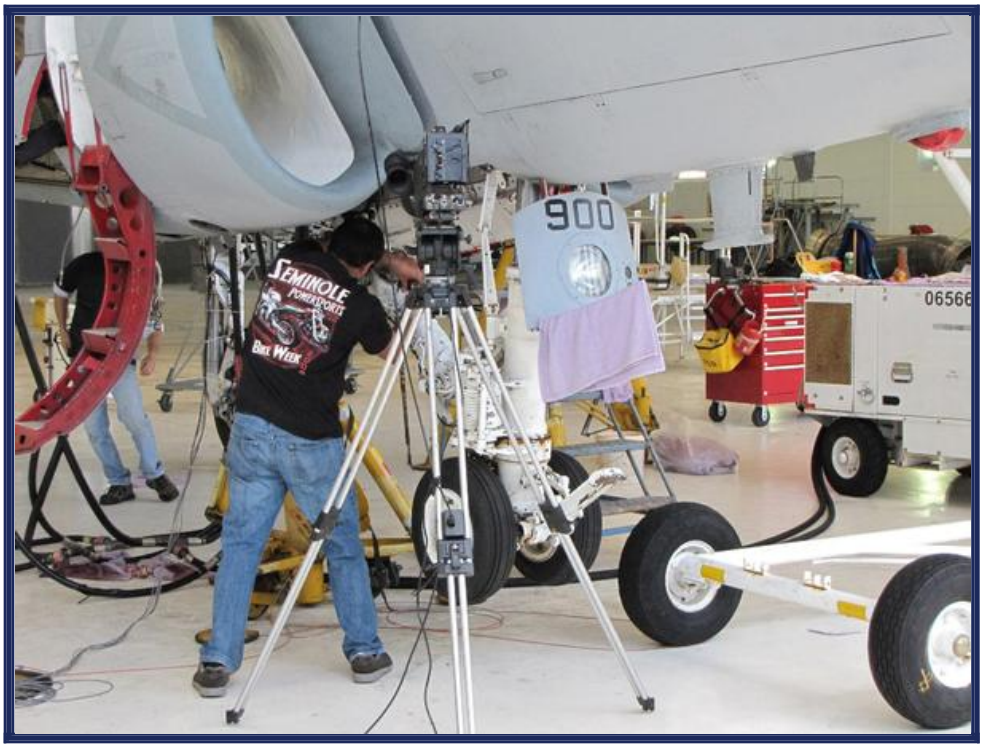
May 29, 2012

FRCSE investigates Prowler problem, hydraulic spike likely culprit



An aircraft mechanic at Fleet Readiness Center Southeast swaps functional aircraft components for faulty ones on the nose landing gear (NLG) of a non-operational EA-6B Prowler electronic warfare aircraft during a weeklong investigation in April to determine the cause of slow-to-indicate NLG events resulting in collapse. (Photo courtesy Matt Tundermann)

JACKSONVILLE, Fla. – Engineers and support personnel at Fleet Readiness Center Southeast recently conducted nose landing gear (NLG) testing on an EA-6B Prowler electronic warfare aircraft to determine the cause of NLG collapses that have plagued the Prowler fleet for years.

The team used a non-operational Prowler to simulate landing conditions to test for an elusive problem that engineers believed involved either a mechanical or hydraulic systems malfunction or both.

EA-6B Fleet Support Team (FST) Subsystems Group Lead Becky Thacker said using an aircraft being struck from the fleet that “would never fly again” was ideal for creating controlled conditions to conduct the investigation.

The Prowler provides an umbrella of protection for strike aircraft, ground troops and ships by jamming enemy radar, electronic data links and communications.

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“We have had NLG collapse events resulting in aircraft damage and unscheduled maintenance,” said Thacker. “I have not seen a test of this magnitude accomplished at a depot facility where technology was so efficiently inserted into an operational testing situation.”

She said the team monitored and recorded pressures at various points in the NLG hydraulic system during normal landing gear extension and retraction, as well as during introduction of some common NLG components prone to failures.

“Historically we looked at mechanical failures, and we saw mechanical failures,” said Thacker. “Mechanics are more visual, but hydraulic issues can be hidden.”

Thacker credits the success of the weeklong testing in part to the excellent planning and coordination by FST Subsystems Engineers Matt Tundermann and Paul Casey who established a repeatable test plan to obtain the data they would need to go forward with any design recommendations.

“We purchased pressure transducers to convert hydraulic pressures into electronic signals that were read by a computer with DaqView (graphical data acquisition) software to produce real-time hydraulic data,” said Tundermann. “Becky and Cliff (Carter) did timing checks, recorded data and provided engineering expertise on the floor.”

Casey said Videographer Greg Jasmin set up three video cameras, one in the cockpit on the landing gear indicators, one on the NLG and another on two computer screens to capture the action. Jasmin developed a computerized timeline using a hydraulic pressure chart to synchronize the three shots for detecting any hydraulic spikes.

“This has been such an elusive problem with a whole host of issues, any of which could contribute,” said Casey. “We started with good components and replaced them with bad to see how they affected the test. It took seven to twelve seconds for each testing evolution. A lot of things were moving fast and happening all at once.”

Tundermann and Casey coordinated the efforts of multiple FRCSE personnel throughout the testing period including Information Technology Specialist Paula Baker, Electrical Measurement Equipment Mechanic Jim Ranieri with the Calibration Laboratory and Electronics Mechanic Travers Grace from the engine test cell.

In addition, EA-6B production line personnel led by Overhaul and Repair Supervisor Jim Bain ensured the continuous operational status of the test. Artisans installed and removed aircraft components, and operated aircraft controls and support equipment.

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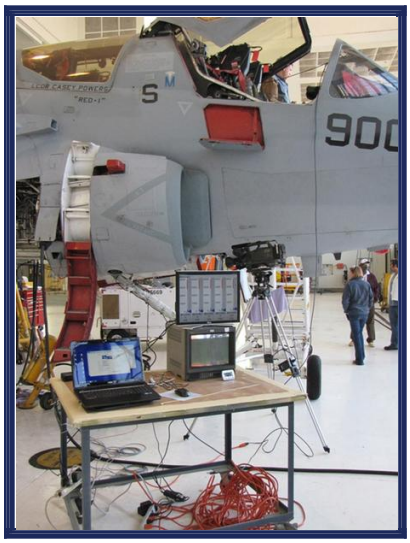
Casey said Robert Szarmach with Naval Air Technical Data & Engineering Service Command lent his invaluable Prowler technical expertise to the project.

The team concluded that even in its raw format, the data has great potential for revealing some significant findings including hydraulic system spikes, a starting point for reducing the risk of NLG failures and enhancing aircrew safety.

Thacker, Casey and Ashley Jurekovic recently graduated from the Naval Postgraduate School Master of Science in Systems Engineering program. They successfully completed the graduate-level curriculum in their spare time, while working full time as FST engineers.



The EA-6B Fleet Support Team Subsystems engineers use a Prowler aircraft struck from the Fleet to recreate landing conditions to test for an elusive nose landing gear (NLG) problem caused by either a mechanical or hydraulic systems malfunction or both. They place video cameras in the cockpit, on the NLG, and on monitors wired to a computer to capture hydraulic spike data. (Photo courtesy Matt Tundermann)

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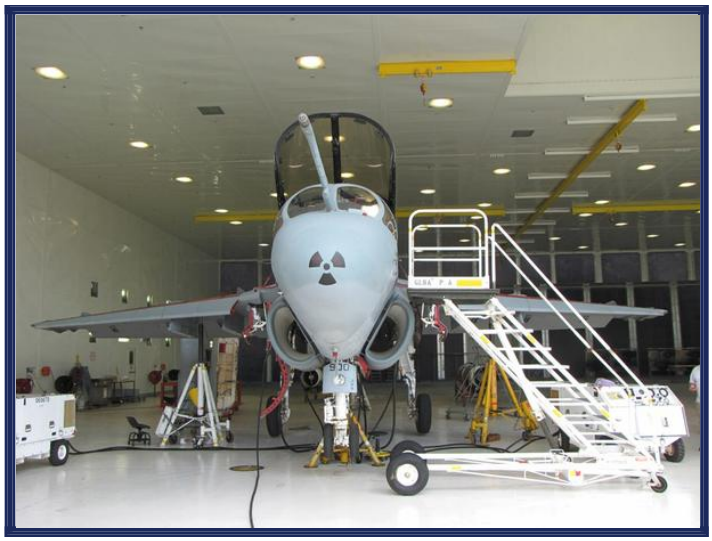

Fleet Support Team Subgroup engineers use a defunct EA-6B Prowler aircraft to conduct a weeklong investigation in April at Fleet Readiness Center Southeast to determine the possible causes of nose landing gear (NLG) failures. Preliminary data reveals hydraulic system spikes may be a significant factor in NLG collapses. (Photo courtesy Matt Tundermann)

Fleet Support Team (FST) Subsystems Engineers Paul Casey (right) and Matt Tundermann (not pictured) established a repeatable test plan to obtain hydraulic spike data needed to justify any EA-6B Prowler systems redesign proposals. During weeklong testing in April at Fleet Readiness Center Southeast, the engineers were aided by Jim Ranieri (left), an electrical measurement equipment mechanic, FST Subsystems Engineer Cliff Carter (center), and a host of Fleet Readiness Center Southeast support personnel. (Photo courtesy Matt Tundermann)